**NASA DEVELOP National Program**

**** NASA Langley Research Center

**Summer 2014**

**Colombia Mi Pronostico Application and DEVELOPedia**

*Updating and improving the Mi Pronostico Flood Web Application in Colombia and improving the functionality of DEVELOPedia*

**Team Lead:** Stephanie Rushley (North Carolina State University), Stephanie.S.Rushley@nasa.gov

**Team Members:**

Daniel Winker (University of Virginia)

Adam White (Christopher Newport University)

Charles Chiou (Old Dominion University)

Matthew Carter (US Air Force)

Kevin Haywood (US Air Force)

Rick Farmer (Graduate of Mathews High School)

Anthony Pototzky (Old Dominion University)

**Advisors & Mentors:**

Lauren Childs-Gleason (DEVELOP)

Angelica Gutierrez-Magness (NOAA)

Ricardo Quiroga (IDEAM)

Pilar Galindo (IDEAM)

**Past or Other Contributors:**

John Hicks - DEVELOPedia

Jim Farmer - DEVELOPedia

**Applied Sciences National Applications Addressed:**

Technology

**Study Area:** La Mosca Watershed in Colombia

**Study Period:** Real time application

**Partners/Collaborators**

DEVELOP: Lauren Childs-Gleason

NOAA: Angelica Gutierrez

Instituto de Hidrologia, Meteorologia y Estudios Ambientales: Pilar Galindo and Ricardo Quiroga

**80-100 Word Blurb**

The DEVELOP Tech Team is working on two main projects. First, we are improving the functionality of DEVELOPedia, which is a database of general information about DEVELOP, including information about past and present projects, partners, and DEVELOP centers. DEVELOPedia, once operational, will allow DEVELOP users to look up previous project information, including centers and partners. For the second project we are working with the Instituto de Hidrologia, Meteorologia y Estudios Ambientales (Institute of Hydrology, Meteorology and Environmental Studies, IDEAM) in Colombia on updating and improving the Mi Pronostico web application, which already notifies people when there is a flood warning, to include information on flood risk areas and meteorological data.

**Community Concerns**

Mi Pronostico

· The location of Colombia in the tropics, the presence of the Andes Mountains, the passage of the Intertropical Convergence Zone (ITCZ), and the influence of the El Niño-Southern Oscillation (ENSO) cause precipitation to be highly variable across Colombia. The spatially inconsistent and often heavy precipitation, together with complex topography, consisting of valleys, plateaus, and mountains, places Colombia at high risk for flooding.

. The spatial and temporal variability in precipitation amounts presents a concern for the efficiency of water use in local communities throughout Colombia.

DEVELOPedia

· There are many files stored in a series of folders currently on the Develop Exchange. DEVELOPedia’s goal is to sort, organize, and graphically enhance the information and images into a more user-friendly environment.

· Data and records can be created and updated by any user making the site versatile, customizable, and easy to use.

**Current Management Practices & Policies**

Mi Pronostico

IDEAM currently estimates daily precipitation using Geostationary Operational Environmental Satellites (GOES) at a 4 km2 spatial resolution, which complements Colombia’s National Network of observation stations. Near-real-time data from Tropical Rainfall Measuring Mission (TRMM) can be used to improve the temporal resolution of the measurements. Additionally, IDEAM currently has no method of measuring surface elevation. This data can be obtained from NASA EOS sensors such as ASTER.

DEVELOPedia

DEVELOPedia is capable of uploading, listing, and displaying information and projects related to DEVELOP. Much of the current displays are lacking in the ability to sort into tables. Contents on the main page are not well organized, creating the need for an improved interface which will be more user-friendly. The current database of DEVELOP projects is in webpage format, sorted into various folders, not very conducive to searching.

**Abstract**

Mi Pronostico

The DEVELOP Tech Team will be updating and improving a web application that is run by the Instituto de Hidrologia, Meteorologia y Estudios Ambientales (the Institute of Hydrology, Meteorology and Environmental Studies, IDEAM). The application, Mi Pronostico, will be updated to include an interactive map which will allow users to search for a location and view the current conditions in regard to rainfall and flood warnings. Precipitation data from the National Aeronautics and Space Administration (NASA) Tropical Rainfall Measuring Mission (TRMM)’s near-real-time rainfall products as well as precipitation data from IDEAM and stations in the La Mosca River Basin will be used to create rainfall distribution maps for the region. Colombia is a country that has highly variable terrain from the Andes Mountains to plains and coastal areas; due to the diverse topography some areas are more prone to flooding disasters, to identify these areas we will be using topography based indices, specified by IDEAM and spatially analyzed using NASA Advance Spaceborne Thermal Emission and Reflection Radiometer (ASTER). Using precipitation data and digital elevation model based indices, a risk map will be developed for the people of Colombia to identify areas of risk as well as link this spatial risk information to an early warning system that will not only alert the people of Colombia to take shelter, but give locations of shelters. We will be creating a preliminary risk assessment map to a pilot study area of the La Mosca River basin.

DEVELOPedia

The Tech Team will also be undergoing the task of creating “DEVELOPedia.” DEVELOPedia is a wiki-based website that will contain all records, documents, images, and data currently stored in the Develop Exchange. By creating a wiki to organize the data, all important records will have separate pages where information can be added and edited by the user. The user will possess the ability to add a new employee record, project record, application area, and Develop Center. During the data-creation process, the user will be asked to fill out a form, or a template, to submit the new data to the website. Once data creation has been completed, the user will be redirected to the new form they have just generated where they can view and continue to edit information. Records are sorted into categories which will be able to be accessed and easily displayed in a sortable table.

**Decision Support Tools**

Mi Pronostico

1. An interactive web-accessible map showing near-real time precipitation information.
2. Indices and slope used to create a flood risk map of Colombia.

DEVELOPedia

1. Sortable tables to maintain organization
2. Gallery to display of photos, files, etc.
3. User-friendly displays across wiki
4. Ability to upload multiple files at once
5. Categorical listings and individual pages dedicated to projects, application areas, and DEVELOP centers and personnel.

**Benefit to End-User:**

* Ability of public in Colombia to view flood risk locations and seek shelter in the event of a flash flood.
* Better use of water resources in Colombia, based on risk areas and certain indices set by the IDEAM.
* Database for DEVELOP users will allow DEVELOP members to access old DEVELOP projects and scripts.
* User friendly showcasing of DEVELOP projects, people, and centers.

**Earth Observations & Parameters**

ASTER – Elevation data

TRMM – Near-Real-Time precipitation data

**Future Applicable NASA Missions**

TRMM near-real-time used for precipitation maps

DEVELOPedia will streamline former projects and make them a resource for future DEVELOP members

**Models Utilized**

N/A

**Ancillary Datasets Utilized**

Stream and meteorological station data from IDEAM

**Software Utilized**

ArcGIS - Raster Analysis and map creation for Mi Pronostico web application

Oracle - Web development

SQL - Web Development

MediaWiki - DEVELOPedia wiki package.